WHAT IS CLAIMED IS:

1. A mover device comprising:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base;

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base; and

a velocity controlling unit that controls the moving velocity of the processing base with respect to the fixed base,

the moving force generating unit being designed to generate a moving force to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base on the fixed base being moved in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base.

2. A mover device comprising:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base; and

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base,

the moving force generating unit being designed to generate a moving force to accelerate and decelerate the processing base with respect to the movable base, so as to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base forming an inertial force processing unit that is moved on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, the inertial force processing unit being designed to convert the reaction force caused by the movement of the processing base into linear-direction inertial movements of the movable base, so that the processing base and the movable base linearly move with respect to each other, and

the moving force generating unit being controlled so as to control the moving velocity of the processing base and the movable base that interactively move on the fixed base in linear directions.

3. A mover device comprising:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base; and

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base,

the moving force generating unit being designed to generate a moving force to accelerate and decelerate the processing base with respect to the movable base, so as to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base forming an inertial force processing unit that is moved on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, the inertial force processing unit being designed to convert the reaction force caused by the movement of the processing base into linear-direction inertial movements of the movable base, so that the processing base and the movable base linearly move with respect to each other, and

the moving force generating unit being controlled so as to control the moving velocity of the processing base with respect to the fixed base.

4. A mover device comprising:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base;

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base;

a P-F measuring unit that is provided between the processing base and the fixed base, and an M-F measuring unit that is provided between the movable base and the fixed base,

the moving force generating unit being designed to generate a moving force to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base forming an inertial force processing unit that is moved on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, and

the moving force generating unit being controlled so as to control the moving velocity of the processing base with respect to the fixed base, using signals generated from the P-F measuring unit and the M-F measuring unit.

5. A mover device comprising:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base;

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base; and

a P-M measuring unit that is provided between the processing base and the movable base and an M-F measuring unit that is provided between the movable base and the fixed base,

the moving force generating unit being designed to generate a moving force to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base forming an inertial force processing unit that is moved on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, and

the moving force generating unit being controlled so as to control the moving velocity of the processing base with respect to the fixed base, using signals generated from the P-M measuring unit and the M-F measuring unit.

6. A mover device comprising:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base;

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base; and

a P-F measuring unit that is provided between the processing base and the fixed base, and a P-M measuring unit that is provided between the processing base and the movable base,

the moving force generating unit being designed to generate a moving force to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base forming an inertial force processing unit that is moved on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, and

the moving force generating unit being controlled so as to control the moving velocity of the processing base with respect to the fixed base, using signals generated from the P-F measuring unit and the P-M measuring unit.

7. The mover device as claimed in claim 1, wherein the movable base has a greater mass than the processing base so that the movable base functions as an inertial force processing weight and that the movement of the movable base by virtue of the reaction force is made smaller than the movement of the processing base.

8. The mover device as claimed in claim 1, wherein the linear-direction inertial movement of the movable base caused by the reaction force generated from the movement of the processing base includes accelerating or decelerating movements and a uniform velocity movement.

9. The mover device as claimed in claim 7, wherein, so as to start moving the movable base by virtue of the moving force generated from the moving force generating unit to move the processing base, the moving force generating unit moves the processing base with a greater moving force than a moving force that overcomes a moving force required to start moving the movable base and then moves the movable base in the opposite direction, the moving force generating unit thereby forcing the movable base to start moving.

10. The mover device as claimed in claim

1, wherein the velocity controlling unit includes a first detector that detects the moving state of the processing base with respect to the fixed base, and a controller that controls the moving force generating unit based on a detection result of the first detector.

11. The mover device as claimed in claim 1, wherein the velocity controlling unit includes:

a second detector that detects the moving state of the movable base with respect to the fixed base;

a third detector that detects the moving state of the processing base with respect to the movable base; and

a controller that controls the moving force generating unit based on detection results of the second detector and the third detector.

12. The mover device as claimed in claim 1, wherein the velocity controlling unit includes:

a first detector that detects the moving state of the processing base with respect to the fixed base;

a second detector that detects the moving state of the movable base with respect to the fixed base;

a third detector that detects the moving state of the processing base with respect to the movable base; and

a controller that controls the moving force generating unit based on detection results of at least two of the first detector, the second detector, and the third detector.

13. The mover device as claimed in claim 1, wherein the velocity controlling unit includes:

a first detector that detects the moving state of the processing base with respect to the fixed base;

a second detector that detects the moving state of the movable base with respect to the fixed base;

a third detector that detects the moving state of the processing base with respect to the movable base; and

a controller that controls the moving force generating unit based on detection results of the first detector, the second detector, and the third detector.

14. The mover device as claimed in claim 1, wherein the movable base is guided by a first linear support guide, to move linearly with respect to the fixed base.

15. The mover device as claimed in claim 1, wherein the processing base is guided by a second linear support guide, to move linearly with respect to the movable base.

16. The mover device as claimed in claim 1, wherein the processing base is guided by a third

linear support guide provided on the fixed base, so as to move linearly with respect to the fixed base.

17. The mover device as claimed in claim 1, wherein the velocity controlling unit controls the processing base to reciprocate in a predetermined range.

18. The mover device as claimed in claim 17, wherein the velocity controlling unit sets a region in which the processing base moves at a uniform velocity.

19. The mover device as claimed in claim 17, wherein the velocity controlling unit controls the processing base to reciprocate in the predetermined range in such a manner that the processing base moves in both directions at the same velocity in each uniform velocity reciprocation movement.

20. The mover device as claimed in claim 17, wherein the velocity controlling unit repeats acceleration control, uniform velocity control, and deceleration control, while moving the processing

base with respect to the fixed base.

21. The mover device as claimed in claim 1, wherein the center of composite gravity of the processing base and the movable base in the linear moving directions is maintained at a predetermined point that is located on the fixed base, regardless of movements of the processing base and the movable base.

22. The mover device as claimed in claim 1, wherein the moving force generating unit is a linear motor that can linearly reciprocate.

23. The mover device as claimed in claim 22, wherein the linear motor is of a coreless coil type.

24. The mover device as claimed in claim 1, further comprising a positional deviation correcting unit that corrects a positional deviation of the movable base from a predetermined reference position with respect to the fixed base.

25. The mover device as claimed in claim 24, wherein a positional deviation of the movable

base from the predetermined reference position with respect to the fixed base is detected by the second detector.

26. The mover device as claimed in claim 1, further comprising a positional deviation correcting mechanism that acts between the movable base and the fixed base, and corrects a positional deviation of the movable base from a predetermined reference position, the positional deviation correcting mechanism being provided in a position in which the fixed base and the movable base face each other with respect to the moving direction of the movable base.

27. The mover device as claimed in claim 26, wherein the positional deviation correcting mechanism can adjust a range in which a positional deviation can be corrected.

28. The mover device as claimed in claim 26, wherein the positional deviation correcting mechanism utilizes magnetism for correcting a positional deviation of the movable base from the predetermined reference position.

29. The mover device as claimed in claim 26, wherein the positional deviation correcting mechanism utilizes a spring for correcting a positional deviation of the movable base from the predetermined reference position.

30. The mover device as claimed in claim 17, further comprising a reverse facilitating unit that helps the processing base to reverse the moving direction so as to keep reciprocating, the reverse facilitating unit being provided between the movable base and the processing base.

31. The mover device as claimed in claim 1, further comprising an auxiliary driving unit that drives the movable base to move with respect to the fixed base.

32. The mover device as claimed in claim 31, wherein the auxiliary driving unit is controlled through the second detector that detects the moving state of the movable base with respect to the fixed base.

33. The mover device as claimed in claim 31, wherein:

the auxiliary driving unit is controlled through the second detector that detects the moving state of the movable base with respect to the fixed base; and

the moving force generating unit is controlled through the first detector that detects the moving state of the processing base with respect to the fixed base.

34. The mover device as claimed in claim 26, wherein the positional deviation correcting mechanism utilizes an auxiliary driving unit for correcting a positional deviation of the movable base from the predetermined reference position, the auxiliary driving unit driving the movable base to move with respect to the fixed base.

35. The mover device as claimed in claim 31, wherein the velocity controlling unit utilizes the auxiliary driving unit for correcting the moving velocity of the processing base with respect to the fixed base.

36. The mover device as claimed in claim 31, wherein:

the velocity controlling unit controls the moving force generating unit so as to perform acceleration control, uniform velocity control, and deceleration control on the processing base moving with respect to the fixed base; and

the velocity controlling unit also controls the auxiliary driving unit so as to perform velocity control for disturbance correction on the processing base moving with respect to the fixed base.

37. The mover device as claimed in claim 31, wherein the auxiliary driving unit is a linear motor of a coreless coil type.

38. The mover device as claimed in claim 31, wherein:

the center of gravity of the processing base in the linear moving direction is located in the same position as the center of gravity of the movable base in the linear moving direction; and

the point at which the moving force generating unit applies a moving force to the processing base is located in the same position as the center of gravity of the processing base in the linear moving direction and the center of gravity of the movable base in the linear moving direction.

39. The mover device as claimed in claim 31, wherein the center of gravity of the processing base in the linear moving direction is located in the same position as the center of gravity of the movable base in the linear moving direction and the

point at which the moving force generating unit applies a moving force to the processing base, the center of gravity of the processing base in the linear moving direction being also located on the linear moving plane of a second linear support guide that guides and moves the processing base linearly with respect to the movable base.

40. The mover device as claimed in claim 31, wherein:

the velocity controlling unit controls the moving force generating unit, so as to perform acceleration control, uniform velocity control, and deceleration control on the processing base moving with respect to the fixed base; and

the velocity controlling unit also controls the auxiliary driving unit, so as to perform acceleration control, uniform velocity control, and deceleration control on the movable base moving with respect to the fixed base.

41. The mover device as claimed in claim 40, wherein:

the velocity controlling unit controls the moving force generating unit in such a manner that changes of the moving velocity of the processing base with time conform to a first reference trapezoid, the changes of the moving velocity being caused by acceleration, uniform velocity moving, and deceleration; and

the velocity controlling unit controls the

auxiliary driving unit in such a manner that changes of the moving velocity of the movable base with time conform to a second reference trapezoid, the changes of the moving velocity being caused by acceleration, uniform velocity moving, and deceleration.

42. The mover device as claimed in claim 41, wherein a transition point between the acceleration and the uniform velocity moving and a transition point between the uniform velocity moving and the deceleration in accordance with the first reference trapezoid are in synchronization with the corresponding transition points in accordance with the second reference trapezoid.

43. The mover device as claimed in claim 41, wherein:

the first reference trapezoid that represents ideal movements of the processing base is stored beforehand in the velocity controlling unit; and

the velocity controlling unit controls the moving force generating unit to correct the moving velocity of the processing base, when the moving velocity of the processing base deviates from the velocity represented by the first reference trapezoid.

44. The mover device as claimed in claim 41, wherein:

the second reference trapezoid that represents ideal movements of the movable base is stored beforehand in the velocity controlling unit; and

the velocity controlling unit controls the auxiliary driving unit to correct the moving velocity of the movable base, when the moving velocity of the movable base deviates from the velocity represented by the second reference trapezoid.

45. A semiconductor manufacturing apparatus comprising:

a mover device: and

a processing unit that performs processing on a processing object attached to a processing base of the mover device,

the mover device including:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

the processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base;

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base; and

a velocity controlling unit that controls the moving velocity of the processing base with respect to the fixed base,

the moving force generating unit being designed to generate a moving force to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base on the fixed base being moved in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base.

46. A semiconductor manufacturing apparatus of a vacuum processing type, comprising:

a mover device; and

a processing unit that performs processing on a processing object attached to a processing base of the mover device in a vacuum,

the mover device including:

a fixed base;

a movable base that is movable in a linear direction with respect to the fixed base;

the processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base;

a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base; and

a velocity controlling unit that controls the moving velocity of the processing base with respect to the fixed base,

the moving force generating unit being

designed to generate a moving force to move the processing base with respect to the movable base, and, as a result, to move the processing base with respect to the fixed base,

the movable base on the fixed base being moved in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base.

47. The semiconductor manufacturing apparatus as claimed in claim 45, further comprising a mover unit that moves the mover device in a direction perpendicular to the moving direction of the processing base.

48. The semiconductor manufacturing apparatus as claimed in claim 45, further comprising a tilting unit that tilts the mover device.

49. The semiconductor manufacturing apparatus as claimed in claim 45, further comprising a rotator unit that rotates the mover device on an axis that is perpendicular to the moving direction of the processing base.

50. A method of controlling a mover device that includes: a fixed base; a movable base that is moved in a linear direction with respect to the fixed base by a second linear support guide; a processing base that is moved in a linear direction with respect to the movable base by a first linear support guide, the linear direction being in parallel with the linear moving direction of the movable base; a first precise relative position measuring unit that is provided between the processing base and the fixed base; a second precise relative position measuring unit that is provided between the movable and the fixed base; and a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base,

the method comprising the steps of:

generating a moving force from the moving force generating unit to move the processing base with respect to the movable base, thereby moving the processing base with respect to the fixed base by virtue of a moving force acting in the opposite direction as a result of the movement of the processing base with respect to the movable base;

moving the movable base on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, so that the movable base moves in the opposite direction to the moving direction of the processing base on the fixed base; and

controlling the moving velocity of the processing base with respect to the fixed base, using a detection signal generated from the first precise relative position measuring unit.

51. A method of controlling a mover device that includes: a fixed base; a movable base that is movable in a linear direction with respect to the fixed base; a processing base that is movable in a linear direction with respect to the movable base, the linear direction being in parallel with the linear moving direction of the movable base; a moving force generating unit that is provided between the processing base and the movable base, and forms a main moving unit in cooperation with the processing base and the movable base; and an auxiliary driving unit that drives the movable base to move with respect to the fixed base,

the method comprising the steps of:

generating a movable force from the moving force generating unit to move the processing base with respect to the movable base, thereby moving the processing base with respect to the fixed base by virtue of a moving force acting in the opposite direction as a result of the movement of the processing base with respect to the movable base;

moving the movable base on the fixed base in the opposite direction to the moving direction of the processing base by virtue of a reaction force caused by the moving force generated from the moving force generating unit to move the processing base, so that the movable base moves in the opposite direction to the moving direction of the processing base on the fixed base;

controlling the moving velocity of the processing base with respect to the fixed base;

converting the reaction force caused by the movement of the processing base into an inertial moving force to move the movable base, so that the movable base accelerates, decelerates, and moves at a uniform velocity in the linear direction;

controlling the moving force generating

unit to drive the processing base to accelerate, decelerate, and move at a uniform velocity with respect to the fixed base, using a first detector that detects the moving state of the processing base with respect to the fixed base; and

controlling the auxiliary driving unit to drive the movable base to accelerate, decelerate, and move at a uniform velocity with respect to the fixed base, using a second detector that detects the moving state of the movable base with respect to the fixed base, so that the movable base and the processing base are controlled independently of each other.